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(54) **SELF-CONTAINED, STAND-ALONE POWER GENERATOR**

(71) Applicant: **Eugene Reynolds**, Denver, CO (US)

(72) Inventor: **Eugene Reynolds**, Denver, CO (US)

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(51) **Int. Cl.**

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F02B 63/04	(2006.01)
H02J 7/00	(2006.01)
F02N 19/00	(2010.01)
F02N 11/04	(2006.01)

(52) **U.S. Cl.**
CPC ***F02B 63/048*** (2013.01); ***F02N 11/04*** (2013.01); ***F02N 11/0866*** (2013.01); ***F02N 19/00*** (2013.01); ***H02J 7/0013*** (2013.01); *F02N 2011/0896* (2013.01)

(58) **Field of Classification Search**
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USPC 123/179.25, 179.28; 290/31, 32
See application file for complete search history.

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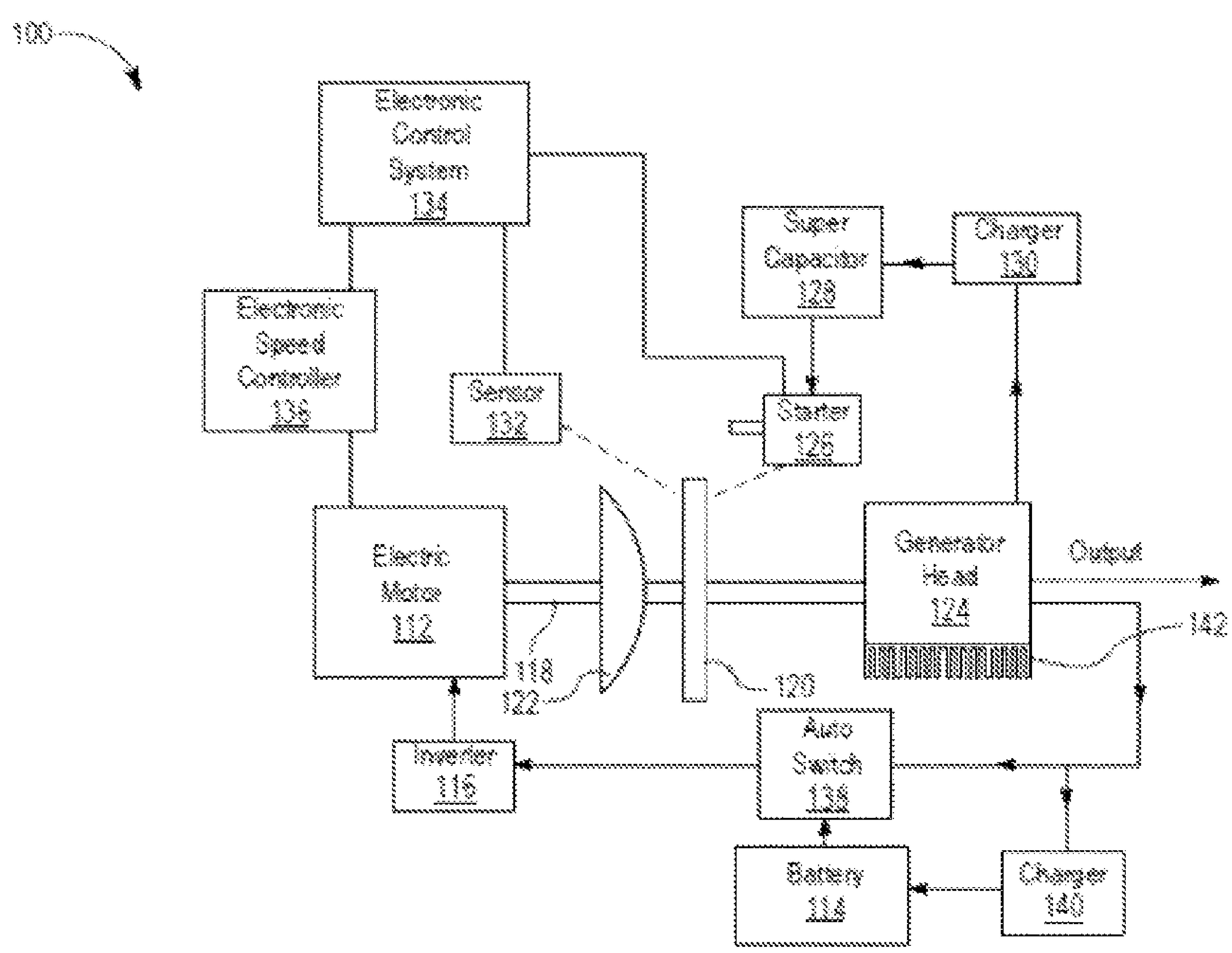
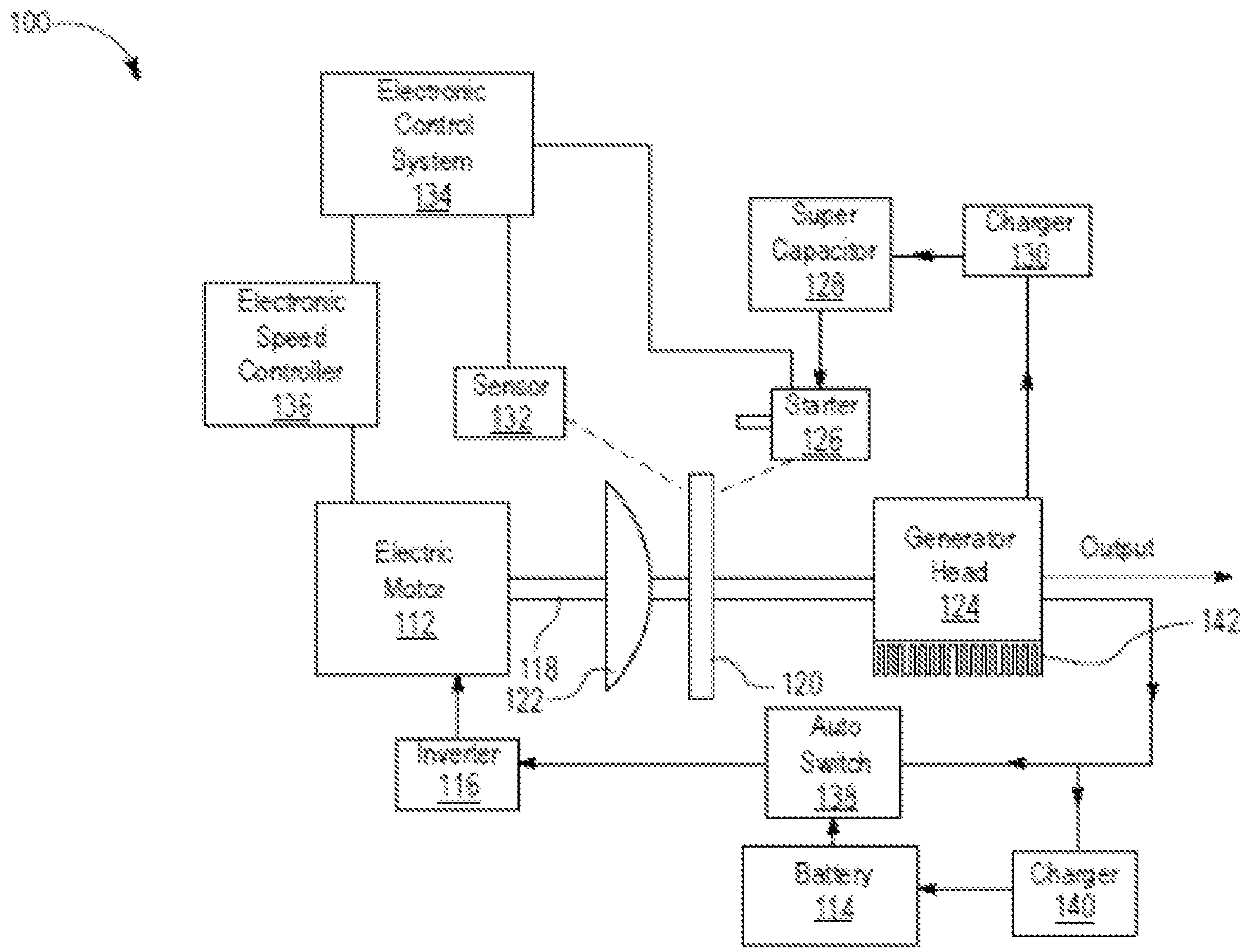
Primary Examiner — Hai H Huynh
(74) *Attorney, Agent, or Firm* — David Michie

(57) **ABSTRACT**

A self-contained, stand-alone power generator system comprising: an electric motor for applying torque to a shaft of a rotating mass, wherein the electric motor is powered by a dedicated power source; a battery for supplying additional power to the electric motor upon start up; at least one of a torque converter and a starter motor, for overcoming resting inertia of the rotating mass; a generator head coupled to the rotating mass, wherein the power generator is constructed such that when the generator head reaches operational speed, the generator head provides the additional power to the electric motor and recharges the battery.

18 Claims, 4 Drawing Sheets




100
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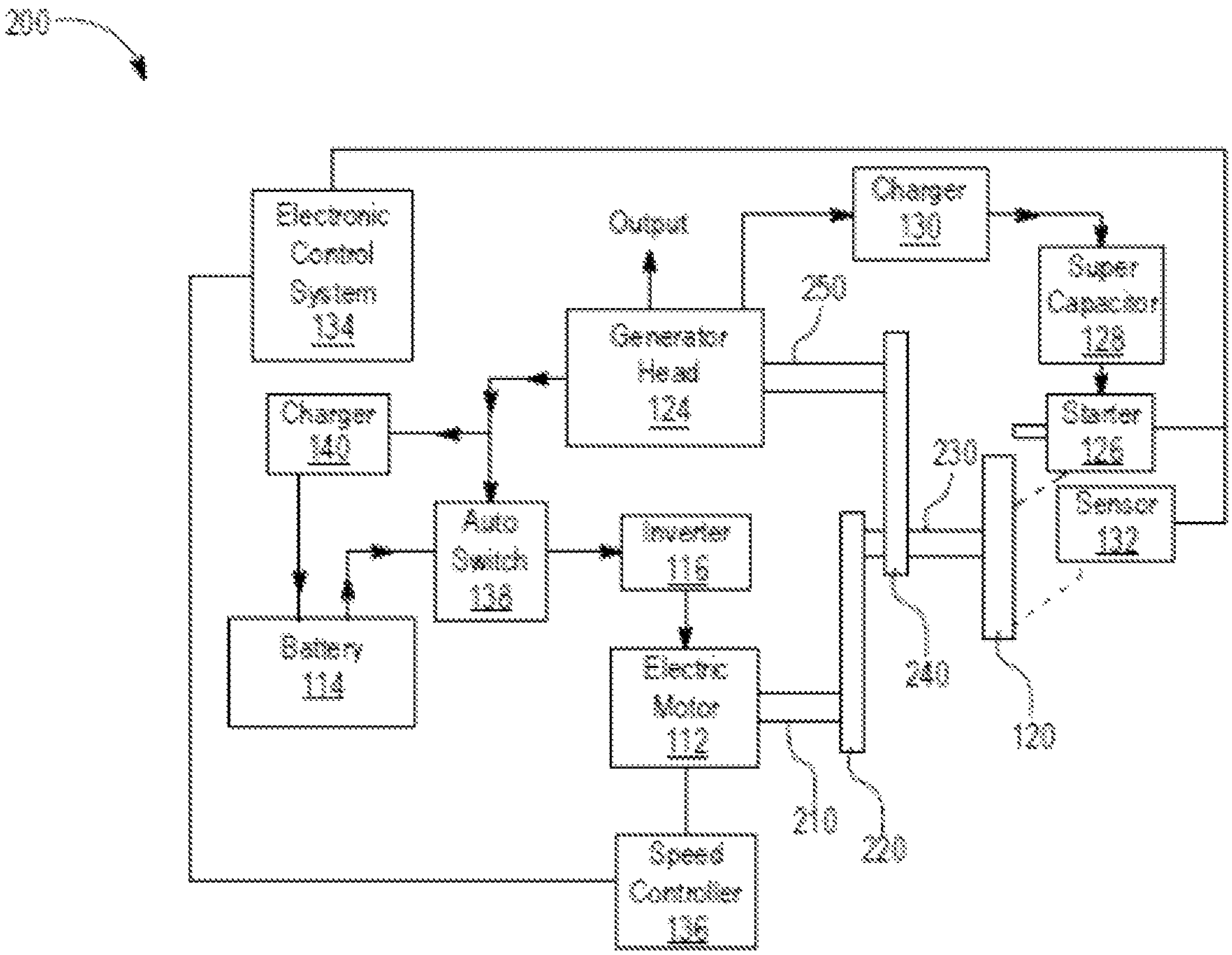
Super Capacitor 128
Charger 130
Electronic Speed Controller 136
Sensor 132
Starter 126
Electric Motor 112
Generator Head 124
Output
118
122
120
142
Auto Switch 138
Inverter 116
Battery 114
Charger 140

Fig. 1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Generator Head 124
Charger 140
Starter 126
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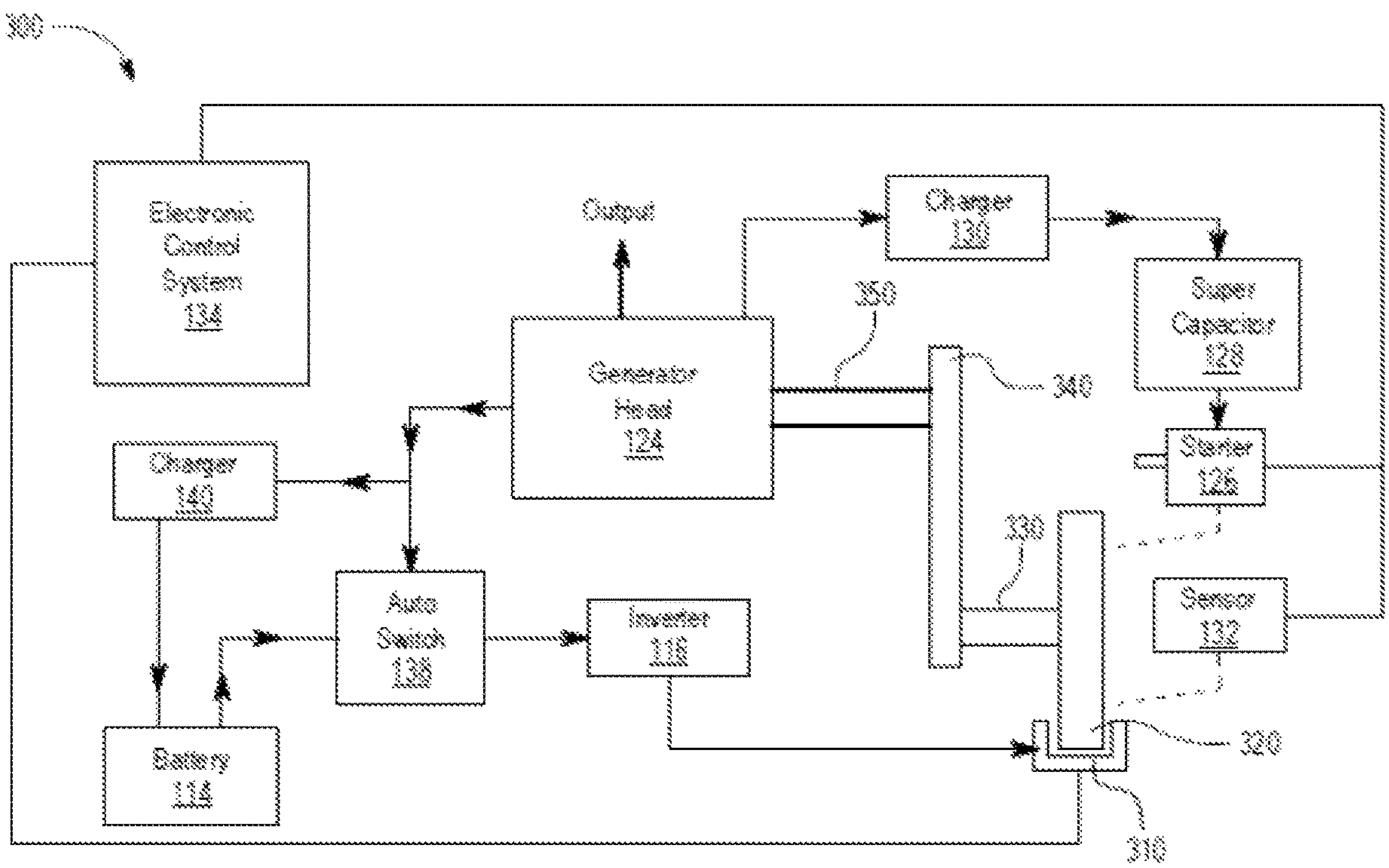
Sensor 132
Auto Switch 138
Inverter 116
Battery 114
Electric Motor 112
240
120
210
220
Speed Controller 136

Fig. 2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Electronic
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System
134
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Charger
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128
Generator
Head
124
350
340
Charger
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Starter
126
330
Auto
Switch
138
Inverter
118
Sensor
132
Battery
114
320
310

Fig. 3

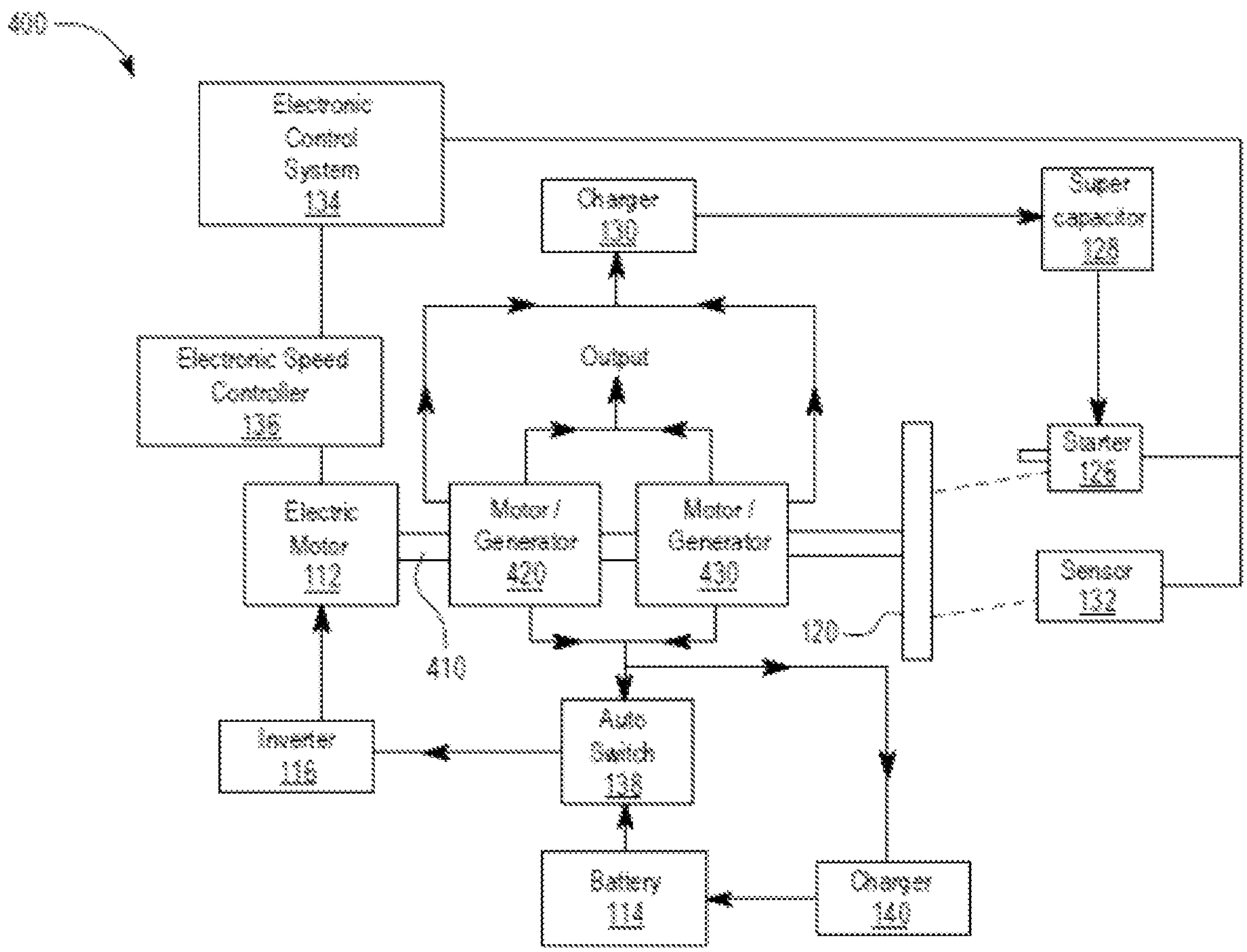
400
Electronic Control System 134
Charger 130
Super capacitor 128
Electronic Speed Controller 136
Output
Starter 126
Electric Motor 112
Motor / Generator 420
Motor / Generator 430
Sensor 132
120
410
Inverter 116
Auto Switch 138
Battery 114
Charger 140

Fig. 4

SELF-CONTAINED, STAND-ALONE POWER GENERATOR

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a non-provisional of, and claims the benefit of priority from, U.S. Provisional Patent Application No. 63/131,570 filed Dec. 29, 2020.

FEDERALLY SPONSORED RESEARCH

Not Applicable.

FIELD OF INVENTION

The present disclosure generally relates to power generators, and more particularly to a self-contained, stand-alone power generator using a rotating mass or flywheel to generate usable power.

BACKGROUND

Electric power generators are useful as an emergency backup in a power outage. In addition, power generators can act as a primary source of power in areas where electricity from the main grid is not accessible. However, these power generators typically require access to combustible fuels, sun, wind, or water.

Some power generators include an internal-combustion engine (ICE) or are started by plugging into grid power. Others are started with a pull cord, or by attaching an external ICE to start the system in motion. There are drawbacks to using a pull cord. For instance, an elderly person might not have the strength to operate the pull cord. In addition, using an ICE or grid power can require access to fossil fuels or to the grid.

SUMMARY

Embodiments of the present disclosure can provide a stand-alone, self-contained power generator that can be set up anywhere without need for, or access to, combustible fuels, water, wind, or sun. As such, electricity can be generated without having to rely on these forms of energy sources. In addition, the power generator may be a portable device that can be easily transported to a location of interest.

In all embodiments, a dedicated power source may supply an electric motor. In some embodiments, additional electrical power may be supplied to the electric motor from a battery. The supplied electrical power may cause the electric motor to rotate. The electric motor can apply torque to a shaft connected to a rotating mass such as a flywheel. The torque applied to the shaft can cause rotation of the flywheel. A torque converter and/or starter motor may be used to overcome the inertia needed to get the flywheel up to operational speed. The flywheel may be connected to a generator head such that the torque from the flywheel is applied to the generator head, causing the generator head to rotate and generate electricity. When the generator head has reached operational speed, the generator head can provide the power for operating the inverter and recharging the battery.

In some embodiments, electrical power can be supplied to at least one electromagnet from a battery. The supplied electrical power may cause the electromagnet to generate a magnetic field. The magnetic field can exert a force on a rotating mass (e.g., flywheel) to cause rotation of the flywheel. A starter motor can be used to overcome the inertia needed to get the flywheel up to operational speed. The flywheel can be connected to a generator head such that the torque from the flywheel is applied to the generator head, causing it to rotate and generate electricity. When the generator head has reached operational speed, the generator head can provide the power for operating the at least one electromagnet and recharging the battery.

In one exemplary embodiment, a self-contained, stand-alone power generator includes an electric motor for applying torque to a shaft of a rotating mass. The power generator further includes a battery for supplying power to the electric motor upon start up. The power generator further includes at least one of a torque converter and a starter motor, for overcoming resting inertia of the rotating mass. The power generator further includes a generator head coupled to the rotating mass. The power generator is constructed such that when the generator head reaches operational speed, the generator head provides power to the electric motor and recharges the battery.

In the above embodiment, the power generator may include a starter motor and a super capacitor for supplying energy to the starter motor. The super capacitor may be recharged by the generator head. The electric motor may be connected to the shaft using at least one of a gear, a sprocket and chain, and a pulley and belt. The power generator may further include a sensor to monitor rotational speed and/or position of the rotating mass. The power generator may further include an electronic control system for controlling speed of the electric motor via an electronic speed controller. The battery and the generator head may be electrically connected to the electric motor via an inverter. The rotating mass can be connected to the generator head via at least one of gear, sprocket and chain, and pulley and belt. The power generator may further include an automatic switch configured to, when the generator head has reached a predetermined operational speed, switch from power supplied by the battery to power supplied by the generator head. A heat sink can be attached to or incorporated into a casing of at least one of the generator head and electric motor, so as to pull heat away from the at least one of the generator head and electric motor.

According to another exemplary embodiment, a self-contained, stand-alone power generator includes at least one electromagnet for generating a magnetic field that exerts a force upon the rotating mass. The power generator further includes a battery for supplying power to the at least one electromagnet upon start up. The power generator further includes a starter motor for overcoming resting inertia of the rotating mass. The power generator further includes a generator head coupled to the rotating mass. The power generator is constructed such that when the generator head reaches operational speed, the generator head provides power to the at least one electromagnet and recharges the battery.

In the foregoing embodiment, the power generator may include a super capacitor for supplying energy to the starter motor. The super capacitor may be recharged by the generator head. The power generator may further include a sensor to monitor rotational speed and/or position of the rotating mass. The power generator may further include an electronic control system for controlling the at least one electromagnet. The battery and the generator head may be electrically connected to the at least one electromagnet via an inverter. The rotating mass may be connected to the generator head via at least one of a gear, a sprocket and chain, and a pulley and belt. The power generator may further include an automatic switch configured to, when the generator head has reached a predetermined operational speed, switch from power supplied by the battery to power supplied by the generator head. The at least one electromagnet can comprise an array of electromagnets arranged around an outside of the rotating mass.

According to another exemplary embodiment, a self-contained, stand-alone power generator includes an electric motor for applying torque to a shaft of a rotating mass. The power generator further includes a battery for supplying power to the electric motor upon start up. The power generator further includes a first motor/generator connected by a shaft to the electric motor. The power generator further includes a second motor/generator connected by a shaft to the first motor/generator. The second motor/generator is connected to the shaft of the rotating mass. The first and second motors/generators are constructed such that when the first and second motors/generators reach operational speed, the first and second motors/generators provide power to the electric motor and recharge the battery.

An objective of the prestation invention is to improve efficiency of maintaining the torque of the flywheel during initial start up and operational changes in load/demand applied to the generator. Ensuring the flywheel has adequate torque would prevent a shut-off, overload, over-heat, or circuit-breaker trip situation. This may occur when electrical demand is increased, but the rotating mass or flywheel of the electrical generator has not built up enough speed/momentum to produce the required electrical energy. Another objective is to reduce the time needed for the generator to start-up and/or adjust to a change in load demand by supplying additional power to the electric motor from a separate battery via an inverter. This would allow the electric motor to more readily respond to an increase demand.

These as well as other aspects and advantages will become apparent to those of ordinary skill in the art by reading the following detailed description, with reference where appropriate to the accompanying drawings. Further, it should be understood that the embodiments described in this summary and elsewhere are intended to be examples only and do not necessarily limit the scope of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

Various ones of the appended drawings merely illustrate example embodiments of the present disclosure and should not be considered as limiting its scope.

FIG. **1** shows a schematic diagram of a power generator according to one example embodiment.

FIG. **2** shows a schematic diagram of a power generator according to one example embodiment.

FIG. **3** shows a schematic diagram of a power generator according to one example embodiment.

FIG. **4** shows a schematic diagram of a power generator according to one example embodiment.

DETAILED DESCRIPTION

Accordingly, embodiments of the present disclosure relate to a self-contained, stand-alone power generator that can provide electricity without access to a combustible fuel source, water, wind or sun.

In all embodiments, a dedicated power source may supply an electric motor (i.e., electrical, mechanical, thermal, etc.). In most embodiment, additional electrical power may also be supplied to the electrical motor from a battery or battery pack (hereinafter referred to as battery) during a time of increased energy demand. The battery may be connected to the electrical motor either directly or through an inverter. The supplied electrical power causes the electrical motor to rotate and/or increase rotational speed during times of increase electoral load demand. The electric motor may apply torque (e.g., rotational energy) to a shaft connected to a rotating mass (e.g., a flywheel). In most embodiments, the electric motor applies the torque to the shaft either by being directly connected to the shaft, or connected through at least one of a series of pulleys and belts, sprockets and chains, and gears. By using connections other than a direct connection, the electrical motor may use ratios other than 1:1 to achieve proper rotational speeds of the flywheel more efficiently. The torque applied to the shaft connected to the flywheel induces angular momentum (or, simply, rotation) in the flywheel.

In most embodiments, the mass of the flywheel may be significant, it may be useful to have a system or method in place to overcome the inertia needed to get the flywheel rotating, and thus the generator head may be used to bring the flywheel up to operational speed. For instance, a speed sensor may be used to monitor the rotational speed of either the flywheel or the shaft connected to the flywheel. The output torque of the electric motor may be applied to the shaft of the flywheel through a torque converter. This torque converter may allow the electric motor to get the flywheel up to rotational speed without putting an excessive load on the electric motor.

In a main embodiment, a high-speed, high-torque, short-use motor may be used to help overcome the resting inertia of the flywheel and induce angular momentum (or rotation) into the flywheel. The faster the flywheel can be started in the rotating process at this point would reduce the strain on and increase the speed at which the electric motor may get the system up to operational speed. It may be possible to use the starter motor only during the initial start up sequence, with the starter motor not otherwise being connected to any components in the system.

In some embodiments, the starter motor may need more energy than can be safely provided by a battery. In this case, super capacitors may be used to supply the necessary energy to the starter motor during start-up. Once started and running, the generator head can recharge the super capacitors for next use. During start up, the speed sensor can monitor the speed of the shaft or flywheel. This information can be sent to an electronic control system. This control system can control the speed of the electric motor via an electronic speed controller. The speed controller may adjust the speed of the electric motor up or down as necessary to bring the power generator system up to a predetermined, operational speed so as to reduce strain on the connected components.

In most embodiments, the flywheel can be connected to the generator head via the same methods used to connect the electric motor to the flywheel described above. Torque from the flywheel can be applied to the generator, causing the generator to rotate. The generator can generate electricity when rotating. When the generator has reached the proper predetermined operational speed, power for operating the inverter may switch from being supplied by the battery to being supplied by the generator either through direct connection or through an automatic switch device. The automatic switch device may be part of an overall electronic control system or a standalone device. Once the generator is operating normally and power has switched from the battery to the generator, the generator may recharge the battery as well as any connected super capacitors.

In another embodiment, angular momentum may be induced into the flywheel by using an electromagnet system. In this configuration, the electric motor may be removed and an array of electromagnets may be arranged around the outside of the flywheel in a specific configuration. The flywheel may be made of a non-magnetic or low-magnetic material to prevent possible interference with the electromagnets and/or malfunction. Permanent magnets or a magnetically reactive material may be arranged on a surface of the flywheel in a circular pattern at regular intervals. The electromagnets may be arranged around an outside of the flywheel in a non-regular interval so as to optimize a push-pull operation. When using permanent magnets, one electromagnet can operate to "pull" a magnet towards itself, and another electromagnet can operate to "push" a magnet away from itself. The electromagnets can switch polarity as needed in this operation. The timing and frequency of these pulses may be determined by both the speed sensor and a position sensor that monitors the position of the flywheel. The speed and position sensors may be used to maintain proper operating speed. The electromagnet array may require less power for operation as compared to a system utilizing an electric motor.

In most embodiments, the electrical output of the generator may be used to provide power to external devices and to provide power to the motor or electromagnet array. The electrical output of the generator may also be used to recharge the battery and any connected supercapacitors. The power can be provided by an inverter or inverters electrically connected to the output of the generator head.

Other than the difference between using an electric motor and an electromagnet array, interconnectivity between the components may remain the same in either configuration of generator. Either configuration may use an electronic control module to monitor the various components (i.e., the motor, the electromagnet, and/or the flywheel) to maintain operational speed, any charging of batteries and/or connected supercapacitors, and/or the functional stability of the components.

In another embodiment, an electric motor may be connected by a shaft to a first generator/motor that may then connected by a first shaft to a second generator/motor that may be then connected by a second shaft to a flywheel. In some embodiments, a through-shaft may be used to connect the first generator/motor and the second generator/motor. Each of the first and second motors/generators may be capable of generating 55 kilowatts (55 kW). As such, it may be possible to generate 110 kW in a relatively small space.

In some embodiments, heat may be generated from the various components during operation, most notably the generator head, the electric motor, and/or the electromagnet array. Thus, in those embodiments, a system for pulling heat away from these components may be needed, such as an air cooling system, liquid cooling system, or some combination of those two systems may be used to pull heat away from the various components.

In some embodiments that may use air cooling, heat sinks of some type can be attached to or built into the casings of the relevant components. For example, a heat sink with fins can be used to increase the surface area and help dissipate heat. The Heats sinks may be made of any suitable material, i.e., copper, aluminum, steel, stainless steel, non-ferrous steel, etc., that can effectively conduct heat away from the system.

In some embodiments that may use liquid cooling, heat generated by the components may be transferred to a liquid medium that carries heat away from the system where the liquid may be cooled down and recirculated. The liquid may be circulated through the system by a pump. In some embodiments, a method of cooling the liquid (e.g., via a radiator) may be part of the system. The radiator may be connected to or engineered as part of the casings of the relevant components of the generator.

Referring to the drawings, FIG. **1** shows a power generator system **100** according to an example embodiment. In all embodiments, an electric motor **112** may be supplied with power from a dedicated stored power source, i.e., electrical, mechanical, thermal, etc., (not shown). In all embodiments, an inverter **116** may be activated and/or supply additional power to the electric motor **112** when an output load requires additional output electricity that may cause the electric motor **112** to increase speed to meet the additional demand, so as to assist the electric motor **112**. Electric power may be supplied to the electric motor **112** from a battery **114**. The battery **114** may be removable. The battery **114** may be a rechargeable battery. Thus, the battery **114** may be any of a nickel-cadmium (NiCd) battery, a nickel-metal hydride (NiMH) battery, a lithium-ion (Li-ion) battery, or the like. The battery **114** may be connected to the electric motor **112** through the inverter **116**. The inverter **116** may change direct current (DC) to alternating current (AC). The supplied electrical power may cause the electric motor **112** to rotate. The electric motor **112** may apply torque to a shaft **118** connected to a torque converter **122**. The torque converter **122** may be a fluid type coupling device that transfers rotating power from the electric motor **112** to the flywheel **120**. The torque converter **122** may allow the electric motor **112** to get the flywheel **120** up to operational speed without putting an excessive load on the electric motor **112**.

In most embodiments, a starter motor **126** may be used to help overcome the resting inertia of the flywheel **120** and induce angular momentum of the flywheel **120**. The starter motor **126** may be a high-speed, high-torque, short-use motor (e.g., a starter motor similar to those used in internal-combustion engines). A shaft of the starter motor **126** may carry a small pinion which may engage with a large gear ring around a rim of the flywheel **120** (not shown). In some embodiments, the starter motor **126** may be used only during the initial start up sequence of the power generator system **100**. Otherwise, the starter motor **126** may not be engaged with the flywheel **120**.

In another embodiment, at least one super capacitor **128** may be used to supply the necessary energy to the starter motor **126** during the initial start up sequence. In this embodiment, once the power generator **100** is started and operating, a generator head **124** of the power generator **100** may recharge the super capacitor **128** via a charger **130** so that the at least one super capacitor **128** may be available for use on the next initial start up sequence. In some embodiments, the super capacitor **128** may be a battery, where the battery may be recharged by the charger **130**.

In most embodiments, a sensor **132** may monitor at least one of a rotational speed and a position of the flywheel **120**. The sensor **132** may be an inductive sensor, a hall effect sensor, a magnetoresistive sensor, an optical sensor, or the like. The sensor **132** may be disposed proximate to the flywheel **120**, e.g., close enough to the flywheel to detect the rotational speed and/or the position. In an alternative embodiment, the sensor **132** may be disposed on the flywheel **120**. In another alternative embodiment, the sensor **132** may detect the rotational speed and/or the position of the shaft **118** of the electric motor **112**, where the sensor **132** may be positioned on or proximate to the shaft **118**.

During start up, the sensor **132** may monitor the rotational speed and/or the position of the flywheel **120**. Rotational speed data or position data may be sent to an electronic control system **134**, which may include a processor and a memory. The memory may store programming modules that when executed by the processor, may control the operation of the control system **134**.

In most embodiments, the electronic control system **134** may control a speed of the electric motor **112** via an electronic speed controller **136**. The speed controller **136** may be an electric circuit that controls and regulates the speed of the electric motor **112**. The speed controller **136** may adjust the speed of the electric motor **112** (either by a positive or negative value) to reduce strain on the connected components of the power generator **100**. In some embodiments, the electronic control system **134** may control the starter motor **126** to engage the flywheel **120** upon the initial start up sequence. In most embodiments, once the flywheel **120** is in motion, the starter motor **126** may then disengaged from the flywheel **120**.

In most embodiments, the generator head **124** may be connected to the shaft **118**. Torque from the flywheel **120** may be applied to the generator head **124** that may cause the generator head **124** to rotate. The generator head **124** may generate electricity when rotating. In most embodiments, when the generator head **124** has reached a proper predetermined operational speed and/or electrical power output for operating the power generator **100**, the inverter **116** may switch from being supplied by the battery **114** to being supplied by the generator head **124**. In most embodiments, this switch may happen automatically using an auto switch **138**. In some embodiments, the auto switch **138** may be an automatic transfer switch (ATS) containing a pair of relays (e.g., an auto switch similar to those used for switching recreational vehicles from shore power to generator power). The auto switch **138** may be part of the overall electronic control system **134**. Once the generator head **124** is operating normally and power to the inverter **116** has switched from the battery **114** to the generator head **124**, the generator head **124** may recharge the battery **114** using a charger **140** as seen in FIG. **1**. In some embodiments, the generator head **124** may recharge the supercapacitor **128** using the charger **130**.

In most embodiments, the generator head **124** may have a finned heat sink **142** attached thereto, so as to provide air cooling that may pull heat away from the generator head **124**. In most embodiments, the fins **142** may increase the heat transfer from the generator head **124** by increasing convection between the air and the generator head **124**. In an alternative embodiment, the finned heat sink **142** may be built into a casing of the generator head **124**. In some embodiments, the finned heat sink **142** may also be attached to or built into a casing of the electric motor **112**.

FIG. **2** shows a power generator system **200** according to an example embodiment. The electric motor **112** may be connected by a shaft **210** to a torque converter **220**. The torque converter **220** may be a continuous variable transmission (CVT) which may include two variable diameter pulleys connected by a V-belt (e.g., a torque converter similar to the ones used in go-karts). In an alternative embodiment, a series of pulleys and belts, sprockets and chains, and/or gears may be used in place of the torque converter **220**.

In most embodiments, the torque converter **220** may be connected by shaft **230** to the flywheel **120**. The flywheel **120** may be connected by shaft **230** to a series of pulleys and belts, sprockets and chains, and/or gears **240**. The series of pulleys and belts, sprockets and chains, and/or gears **240** may be connected by shaft **250** to the generator head **124**. The use of the pulleys and belts, sprockets and chains, and/or gears **240** may make the power generator system **200** capable of using ratios other than 1:1 to achieve proper rotational speeds more efficiently.

In another embodiment, FIG. **3** shows a power generator system **300**. In some embodiments, the flywheel **320** may be moved by an array of electromagnets **310** arranged around an outside of the flywheel **320**. The sensor **132** may interact with the flywheel **320** to determine the rotational speed and/or the position of the flywheel **320** via the electronic control system **134** (as discussed above), so that the electromagnets **310** may be energized at the proper a time, interval, duration, and frequency. Power may be provided to the electromagnet array **310** via the inverter **116**

In some embodiments, the flywheel **320** may be made of a combination of ferrous and non-ferrous materials, such that the array of electromagnets **310** may interact with the flywheel **320**. The electromagnets **310** may exert a "pull" type force on a section of the ferrous material of the flywheel **320** as the section of the flywheel **320** approaches individual electromagnets of the array of electromagnets **310**. Once the ferrous material reaches a certain point, the individual electromagnet may be de-energized until the individual electromagnet is needed to "pull" on a next section of ferrous material in sequence of the flywheel **320**. The array of electromagnets **310** may be arranged around the outside of the flywheel **320** to alternately "pull" the ferrous material around in succession, keeping the flywheel **320** spinning at a predetermined speed.

In an alternative embodiment, actual magnets (e.g., permanent magnets) may be arranged on the flywheel **320**. These magnets may be arranged equidistantly around the flywheel **320**. The polarity of the individual electromagnets of the array of electromagnets **310** may be switched as an individual magnet of the magnets passes by/through the individual electromagnet, so that the individual electromagnet "pulls" the individual magnet as the individual magnet approaches the individual electromagnet and "pushes" as the individual magnet passes the individual electromagnet (e.g., similar to how a maglev train operates). This may be done simultaneously by each individual electromagnet of the array of electromagnets **310** to each individual magnet of the magnets.

In some embodiments of the power generator system **300**, the flywheel **320** may be connected by shaft **330** to a series of pulleys and belts, sprockets and chains, and/or gears **340**, which in turn may be connected by shaft **350** to the generator head **124**.

In some embodiments, the array of electromagnets **310** may have a finned heat sink (not shown) attached thereto, or built into a casing of the array of electromagnets **310**, so as provide air cooling and that may pull heat away from the electromagnet array **310**. In some embodiments, the finned heat sink may additionally have the same configuration as the heat sink **142** described above and shown in FIG. **1**.

FIG. **4** shows a power generator system **400** according to an example embodiment. The power generator system **400** may include a first combined motor/generator **420** and a second combined motor/generator **430**. Each of the first and second motor/generator (**420**, **430**) may be a 55 kW permanent magnet motor/generator (e.g., a motor/generator similar to the secondary motor/generator in the first generation of Chevrolet Volt™ vehicles).

In some embodiments, the electric motor **112** may be connected by a through-shaft **410** to the first combined motor/generator **420**. The first combined motor/generator **420** may be connected by the through-shaft **410** to the second combined motor/generator **430**. The second combined motor/generator **430** may be connected by the through-shaft **410** to the flywheel **120**. Each of the first and second combined motors/generators **420**, **430** may provide additional torque to the through-shaft **410** and may also act as a generator to produce output electricity.

In some embodiments, once the first and second combined motors/generators **420**, **430** reach operational speed, the first and second combined motors/generators **420**, **430** may provide power to the electric motor **112** via the auto switch **138** and the inverter **116**. In addition, the first and second combined motors/generators **420**, **430** may recharge the battery **114** using the charger **140**, and may recharge the supercapacitor **128** using the charger **130**. Further, the first and second combined motors/generators **420**, **430** may provide power to external output devices.

As mentioned above, the power output of each of the first and second combined motors/generators **420**, **430** may be 55 kW. In some embodiments, the first and second combined motors/generators **420**, **430** may be relatively compact, decreasing the overall size of the power generator **400**. Thus, the first and second combined motors/generators **420**, **430** may be configured together so that they may generate a total of 110 kW in a relatively compact space.

A method of operating the power generator system **100** in one embodiment. Power from the dedicated power source (not shown) supplies electrical power to the electric motor **112** upon activation and/or start up of the power generator system **100**. The sensor **132** of the electronic control system **135** relays rotational speed of at least one of the shaft **118** and the flywheel **120**. In some embodiments, the electronic control system **134** may then activate the starter motor **126** to apply additional torque to the flywheel **120** until operational rotational speed of the flywheel **120** is achieved. The electronic control system **134** may deactivate the starter motor **126**. The flywheel **120** may then rotate the generator head **124**, which may generate usable output electricity. Once the generator head **124** is providing optimal output power, the generator head **124** may recharge the super capacitor **128** via the charger **130**.

In another embodiment separate or concurrent with the embodiment immediately above, another method for starting and/or maintain the electric motor **112** upon activation of the power generator system **100**. The electric motor **112** may receive additional power from the battery **114** when there may be an increase demand for output power. In this embodiment, the battery **114** may provide additional power directly to the electric motor **112** or through the inverter **116**. The additional power may increase the rotational speed of the electric motor **112** that may increase that rotational speed and/or torque of the shaft **118**. In some embodiments, the rotational speed and/or torque of the shaft **118** may be applied to the torque converter **122** to rotate the flywheel **120**. The flywheel **120** may then rotate the generator head **124**, which may generate usable output electricity. Once the generator head **124** is providing optimal output power, the generator head **124** may activate the auto switch **138** that may directly supply the additional power to the electric motor **112** or the inverter **116**. Additionally, the generator head **124** may recharge the battery **114** via the charger **140**.

In another embodiment, a third method for starting or maintaining the flywheel **320** of the power generator system **300**. Upon activation of the power generator system **300**, the battery **114** may apply the additional power to the array of electromagnets **310** when there may be an increase in demand for output power. The additional power may increase the rotational speed of the flywheel **320** (which may be made of ferrous and non-ferrous material or include a plurality of magnets) via the array of electromagnets **310** using "pull" and "push" forces. Once the generator head **124** is providing optimal output power, the generator head **124** may activate the auto switch **138** that may directly supply the additional power to the array of electromagnets **310**. Additionally, the generator head **124** may recharge the battery **114** via the charger **140**.

In another embodiment, a fourth method for starting or maintaining the electric motor **112** of the power generator system **400**. The electric motor **112** may receive additional power from the battery **114** when there may be an increase demand for output power. In this embodiment, the battery **114** may provide additional power directly to the electric motor **112** or through the inverter **116**. The additional power may increase the rotational speed of the electric motor **112** that may increase that rotational speed and/or torque of the shaft **410**. In some embodiments, the rotational speed and/or torque of the shaft **410** may be applied at least one of the first and second combined motors/generators **420**, **430** and to rotate the flywheel **120**. In some embodiments, the flywheel **120** may assist in maintaining the rotational speed and/or torque applied to the first and second combined motors/generators **420**, **430**. The first and second combined motors/generators **420**, **430** may generate usable output electricity. Once the first and second combined motors/generators **420**, **430** is providing optimal output power, the at least one of the first and second combined motors/generators **420**, **430** may activate the auto switch **138** that may directly supply the additional power to the electric motor **112** or the inverter **116**. Additionally, the at least one of the first and second combined motors/generators **420**, **430** may recharge the battery **114** via the charger **140**.

While the disclosure has been described with reference to exemplary embodiments, it is to be understood that the disclosure is not limited to the disclosed exemplary embodiments. Additionally, it is to be understood that of the many embodiments describe, any and all embodiments may be in combination with one another. The scope of the following claims is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures and functions.

The invention claimed is:

1. A self-contained, stand-alone power generator system comprising:

an electric motor for applying torque to a shaft of a rotating mass, wherein the electric motor is powered by a dedicated power source;

a battery for supplying additional power to the electric motor upon start up;

at least one of a torque converter and a starter motor, for overcoming resting inertia of the rotating mass;

a generator head coupled to the rotating mass,

wherein the power generator is constructed such that when the generator head reaches operational speed, the generator head provides the additional power to the electric motor and recharges the battery.

2. The power generator system according to claim **1**, further comprises a super capacitor for supplying energy to the starter motor, wherein the super capacitor is recharged by the generator head.

3. The power generator system according to claim **1**, wherein the electric motor is connected to the shaft using at least one of a gear, a sprocket and chain, and a pulley and belt.

4. The power generator system according to claim 1, further comprising a sensor to monitor at least one of a rotational speed and a position of the rotating mass.

5. The power generator system according to claim 1, further comprising an electronic control system for controlling a speed of the electric motor via an electronic speed controller.

6. The power generator system according to claim 1, wherein the battery and the generator head are electrically connected to the electric motor via an inverter.

7. The power generator system according to claim 1, wherein the rotating mass is connected to the generator head via at least one of a gear, a sprocket and chain, and a pulley and belt.

8. The power generator system according to claim 1, further comprising an automatic switch configured to, when the generator head has reached a predetermined operational speed, switch from the additional power supplied by the battery to a generated power supplied by the generator head.

9. The power generator system according to claim 1, wherein a heat sink is attached to or incorporated into a casing of at least one of the generator head and electric motor, so as to pull heat away from the at least one of the generator head and electric motor.

10. A self-contained, stand-alone power generator system, comprising:

an electric motor for applying torque to a shaft of a rotating mass, wherein the electric motor is powered by a dedicated power source;

at least one electromagnet for generating a magnetic field that exerts a force upon the rotating mass;

a battery for supplying additional power to the at least one electromagnet upon start up;

a starter motor for overcoming resting inertia of the rotating mass; and

a generator head coupled to the rotating mass,

wherein the power generator is constructed such that when the generator head reaches operational speed, the generator head provides the additional power to the at least one electromagnet and recharges the battery.

11. The power generator system according to claim 10, further comprises a super capacitor for supplying energy to the starter motor, wherein the super capacitor is recharged by the generator head.

12. The power generator system according to claim 10, further comprising a sensor to monitor at least one of a rotational speed and a position of the rotating mass.

13. The power generator system according to claim 10, further comprising an electronic control system for controlling the at least one electromagnet.

14. The power generator system according to claim 10, wherein the battery and the generator head are electrically connected to the at least one electromagnet via an inverter.

15. The power generator system according to claim 10, wherein the rotating mass is connected to the generator head via at least one of a gear, a sprocket and chain, and a pulley and belt.

16. The power generator system according to claim 10, further comprising an automatic switch configured to, when the generator head has reached a predetermined operational speed, switch from the additional power supplied by the battery to a generated power supplied by the generator head.

17. The power generator system according to claim 10, wherein the at least one electromagnet is an array of electromagnets arranged around an outside of the rotating mass.

18. A self-contained, stand-alone power generator system comprising

an electric motor for applying torque to a shaft of a rotating mass, wherein the electric motor is powered by a dedicated power source;

a battery for supplying additional power to the electric motor upon start up;

a first motor/generator connected by a shaft to the electric motor; and

a second motor/generator connected by a shaft to the first motor/generator,

wherein the second motor/generator is connected to the shaft of the rotating mass, and

wherein the first and second motors/generators are constructed such that when the first and second motors/generators reach operational speed, the first and second motors/generators provide power to the electric motor and recharge the battery.

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